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ORIGINS OF PSYLLID FALLOUT IN THE CENTRAL SIERRA NEVADA OF CALIFORNIA (HOMOPTERA)

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Psyllidae (Insecta: Homoptera) make up a major proportion of the wind-blown (aeolian) insect fauna deposited on alpine snowfields in the Sierra Nevada of California (Papp, 1975). During the summers of 1972 to 1974, 1206 psyllid specimens comprising 18 species in six genera were collected on névé snow at 3353 m on Mt. Conness in the Inyo National Forest. Since psyllids are an important food for nival aeolian zone predators and scavengers (Papp, 1978), knowledge of their origin is basic to understanding the dynamics of energy flow into the aeolian ecosystem as well as details of the intrasystem community structure.

Four species of Psyllidae (*Psylla hirsuta, P. magna, P. alba* and *Aphalara artemisiae*) accounted for 93.2% of the total psyllid fallout on Mt. Conness snowfields (Table 1).

At least 14 other species were taken on snow during 1972–74, including some species taken only once. Among these were the widespread pear psylla, *Psylla pyricola* Forster. Hagen (1976, personal communication) has taken this species at high altitudes in the Alps. Another species, *Paratrioza cockerelli* (Sulc) has many solanaceous hosts, including potato and tomato. A complete listing of aeolian psyllids is given in Table 2.

Distribution of the hostplant species for the four common psyllids collected on Mt. Conness snow are given in Table 3. Four species, *Cercocarpus betuloides, Corylus cornuta, Salix melanopsis* and *Salix Hindsiana,* are found only on the west slope of the Sierra Nevada, and none occur above

Table 1. Common psyllids collected on Mt. Conness snowfields, 1972–74.

Species	Specimens collected			Total	% of total
	1972	1973	1974		
Psylla hirsuta (Tuthill)	0	107	165	272	22.6
Psylla magna Crawford	0	245	30	275	22.8
Psylla alba Tuthill	1	453	20	474	39.3
Aphalara artemisiae complex	0	21	82	103	8.5
Other spp.	3	15	64	82	6.8
Total	4	841	361	1206	100.0

Table 2. Aeolian Psyllidae collected on Mt. Conness, 1972–74.

Species	Host(s)
Aphalara calthae complex	*Polygonum* spp., *Artemisia tridentata, Caltha palustris,* others
Aphalara minutissima Crawford	*Artemisia tridentata*
Aphalara veaziei metzaria Crawford	*Achillea millefolium,* other Compositae
Euphalerus vermiculosis Crawford	*Ceanothus* spp., *Lupinus* sp.
Livia juncorum Latreille	*Juncus, Carex, Pinus*
Paratrioza cockerelli (Sulc)	*Solanaceae,* inc. *Solanum tuberosum* (potato) and *Lycopersicon esculentum* (tomato)
Psylla alba Crawford	*Salix melanopsis, S. Hindsiana, S. Hindsiana* var. *sessilifolia, Cercocarpus ledifolius*
Psylla breviata Patch	*Salix*
Psylla hirsuta (Tuthill)	*Cercocarpus ledifolius, Purshia tridentata, Corylus cornuta*
Psylla insignita Tuthill	*Cercocarpus ledifolius*
Psylla magna Crawford	*Cercocarpus ledifolius, C. betuloides,* "Serviceberry" (prob. *Amelanchier*)
Psylla magnacauda Crawford	*Shepherdia argentea, Eleagnus* sp.
Psylla media Tuthill	*Cercocarpus ledifolius, C. betuloides*
Psylla minor Crawford	*Salix californica, S. lasiolepis*
Psylla pyricola Forster	*Pyrus communis* (pear)
Trioza incerta Tuthill	*Salix*
Trioza sp. (*singularis*?)	unknown

2500 m in California. The other hostplants, *Cercocarpus ledifolius* and *Purshia tridentata,* are distributed along the east slope of the Sierra Nevada at altitudes ranging up to 3200 m. While climatological data show that prevailing winds across the Sierra are primarily from the west, southwest, or south (96%, 69%, 88% in 1972, 1973, 1974 respectively) in late spring and early summer, turbulence resulting from high velocity winds blowing across the Sierran crest also create diurnal anabatic (upslope winds) from the eastern deserts. It is therefore apparent that psyllid fallout along the crest of the Central Sierra Nevada has at least two origins: a major component from the Central Valley and the west slope (aeolian transport by geostrophic winds), and a minor component from the Owens Valley and east slope (aeolian transport by anabatic winds originating in the deserts leeward of the Sierra Nevada).

Table 3. Distribution of common psyllid hostplants. (Data from Munz, 1959, 1968.)

Hostplant (Psyllidae)	Distribution
Cercocarpus ledifolius Nuttall (*Psylla hirsuta, P. alba*)	Dry, rocky slopes along the east side of the Sierra Nevada at 1220–3200 m; also in mts. of W Mojave Desert and N to Modoc and Siskiyou Cos.; to E Washington, Montana, Colorado, Arizona, Baja California.
Cercocarpus betuloides Nuttall (*Psylla magna*)	Chaparall and oak woodlands along the W slope of the Sierra Nevada below 1830 m; also cis-montane California to SW Oregon; N Baja California.
Purshia tridentata (Pursh) DeCandolle (*Psylla hirsuta*)	Dry slopes along east side of Sierra Nevada at 900–3200 m; also in the White Mts.; in California ranges from Tulare and Inyo Cos. N to Modoc, Siskiyou and Trinity Cos.; thence to Lake Co., British Columbia, Montana, New Mexico.
Corylus cornuta Marsh (*Psylla hirsuta*)	Damp slopes and banks, below 2200 m, in many plant communities; in the Coast Ranges from Santa Cruz Co. N, and in the Sierra Nevada from Tulare Co. N; to British Columbia.
Salix Hindsiana Benth. (*Psylla alba*)	Common locally among ditches, on sand bars, etc., below 3000 ft; many plant communities; cis-montane California, into Oregon and Baja California.
Salix Hindsiana Benth. var. *leucodendroides* (Rowlee) Ball. (*Psylla alba*)	Sparingly in Santa Clara and Tulare Cos. to Kern Co.; more common Ventura to San Diego Cos. to Baja California.
Salix melanopsis Nutt. (*Psylla alba*)	Stream banks below 8000 ft; many plant communities; Sierra Nevada N to Modoc County, coast ranges from Lake and Sonoma Cos. N; to British Columbia; Rocky Mountains.

Sierran alpine predators and scavengers which are able to withstand the rigors of nival foraging are thus able to take advantage of aerial plankton fallout originating from at least two directions: the forest and riparian biomes to the west, and the pinyon-sagebrush biomes to the east.

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Footnote

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